

**REMARKS**

**The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter because claim 2 includes the limitation “wherein the amplifier amplifies the signal to a maximum allowable input level” is not described in the specification.**

Paragraph [0024] is amended to include the sentence, “The amplifier 502 is provided for this function and can amplify the DPD signal such that the amplified DPD signal corresponds to a maximum allowable input signal level for the tilt search block 110.” (amendment underlined) No new matter is entered as such functionality was described in claim 2 as originally filed.

**Claims 1, 3, 4, and 8-11 are rejected under 35 USC 102b as being anticipated by Fukumoto et al. (US 6,493, 296)**

Applicant has amended claim 1 to include all the limitations of claim 4 because applicant believes that claim 4 should be found allowable with respect to the cited reference of Fukumoto et al. See the following paragraphs for more comments regarding patentability with respect to the cited references. A similar amendment is made to independent method claim 8 to include all the limitations of claim 11 (the method version of claim 4). Claims 4 and 11 are correspondingly cancelled, claims 5 and 7 are amended to become dependent on claim 1, and claim 12 is amended to become dependent on claim 8. Additionally, antecedent basis problems are corrected in claims 7 and 14, and the unnecessary step labels (a, b, c, etc) are deleted from claim 8. No new matter is entered.

In the rejection of original claim 4 (and similarly for claim 11), the Examiner stated (see the Office action dated 10/06/2006), “In regard to claims 4 and 11, Fukumoto et al. teaches wherein when controlling the tilt servo to adjust the tilt angle between the optical disc and the object lens according to the DPD signal, the tilt search block finds an optimal tilt angle having the lowest amplitude DPD signal (fig.5).” However, applicant respectfully disagrees

because Fig.5 of Fukumoto et al. does not show finding an optimal tilt angle having the lowest amplitude DPD signal for adjusting the tilt angle. Referring Fig.5, applicant points out that Fig.5 does not indicate an “optimal” tilt angle. Instead, the graph shows the DPD signal (y-axis) at different main spot positions (x-axis). The graph includes two lines being at two different tilt angles (Tilt 0.0 Deg and Tilt 0.5 Deg). There is nothing in the graph of Fig.5 that indicates finding an optimal tilt angle having a lowest amplitude DPD signal. In fact, applicant points out that it is not even clear which of the two angles illustrated would be considered preferred because at main spot positions  $-0.4$  to  $-0.3$  and  $0.3$  to  $0.4$ , both the  $0.0$  deg tilt and the  $0.5$  deg tilt appear to have the same DPD signal value. Applicant also notes that for positive values of the DPD signal, the  $0.5$  Deg tilt line has the greatest absolute value, while for negative values of the DPD signal, the  $0.0$  Deg tilt line has the greatest absolute value. Applicant asserts it is not disclosed or taught from Fig.5 to find an optimal tilt angle having a lowest amplitude DPD signal for use adjusting the tilt angle, as is claimed in the present invention.

Referring to the specification of Fukumoto et al., applicant points out that Fig.5 is described starting at col 5 line 54 to col 6 line 4. In this section of text (and in the remaining teachings of Fukumoto et al.) there is also no mention of finding an optimal tilt angle being an angle having a lowest amplitude DPD signal for use adjusting the tilt angle. Additionally, referring to col 8, lines 45-54, applicant notes that Fukumoto et al. describe finding “an optimum angle” according to “a differential operation value of the first signal and the second signal, and detecting the inclination angle of the optical disc on the basis of the differential operation value.” In the same column (8) line 38 the first signal is defined as the DPP signal, and on line 42 the second signal is defined as the DPD signal. Applicant notes that subtracting the DPD signal from the DPP signal is also illustrated in Fig.1 in order to control the tilt control motor 102. Such functionality as both stated in text and illustrated by Fukumoto et al. in Fig.1 is not equivalent to “when controlling the tilt servo to adjust the tilt angle between the optical disc and the object lens according to the DPD signal, finding an optimal tilt angle having a lowest amplitude DPD signal”, as is claimed in claim 8 (and similarly in claim 1) of

the present invention.

Because Fukumoto et al. do not teach or suggest every limitation of currently amended claim 1 and claim 8, applicant respectfully asserts that claim 1 and claim 8 should be found allowable with respect to Fukumoto et al. Specifically, Fukumoto et al. at least do not teach or suggest “when controlling the tilt servo to adjust the tilt angle between the optical disc and the object lens according to the DPD signal, the tilt search block finding an optimal tilt angle having a lowest amplitude DPD signal”. Claims 2-3, 5-7, and 9-10, 12-14 are dependent on claims 1 and 8, respectfully, and should therefore too be found allowable. Reconsideration of claims 1-3, 5-11, and 12-14 is respectfully requested.

**Claim 2 is rejected under 35 USC 103a as being unpatentable over Fukumoto et al. in view of Scheffler (US 5,021,893)**

Claim 2 is dependent upon currently amended claim 1, which is believed allowable by the applicant for at least the above stated reasons; therefore, claim 2 should also be found allowable for at least the same reasons because it is dependent upon claim 1.

**Claims 5-7 and 12-14 are rejected under 35 USC 103a as being unpatentable over Fukumoto et al. In view of Gleim (US 4,888,754)**

Claims 5-7 and 12-14 are respectively dependent upon currently amended claim 1 and claim 8, which are believed allowable by the applicant for at least the above stated reasons; therefore, claims 5-7 and 12-14 should also be found allowable for at least the same reasons.

Additionally, the Examiner stated in the Office action mailed 10/06/2006, “In regards to claims 5-7 and 12-14 Fukumoto et al. teaches all the elements of these claims except the use of coarse and fine adjustment of the tilt. Gleim teaches the use of coarse and fine adjustment to control reproduction of data on an optical disc (column 1 lines 44-53).”

Applicant firstly points out that the words “coarse adjustment” and “fine adjustment” are not included in the claims of the present invention. The claimed limitations are more specifically the operations of the optical drive system wherein “the tilt search block controls

the tilt servo to adjust the tilt angle to a first plurality of angles, measures the amplitudes of the DPD signals for the first plurality of angles, controls the tilt servo to adjust the tilt angle to a second plurality of angles centered at the angle having the lowest amplitude DPD signal in the first plurality of angles, and measures the amplitudes of the DPD signals for the second plurality of angles to find the optimal tilt angle.” Applicant notes that nothing even remotely close to such an operation is taught by Gleim in column 1 lines 44-53. Gleim’s mention of course and fine adjustments are directed at mechanisms being very different than the present invention as claimed. In particular, Gleim states, “The coarse adjustment mechanism can for example be a spindle that radically displaces the whole optical pick-up, consisting of the laser diode, the lenses, the beam splitter, and the photodetector. The fine-adjustment mechanism can tilt the beam of light radially, at a prescribed angle for example, in order to advance just the beam by itself slightly along one radius of the compact disk.” Applicant again points out that these teachings of Gleim are not equivalent to (and do not suggest) “the tilt search block controls the tilt servo to adjust the tilt angle to a first plurality of angles, measures the amplitudes of the DPD signals for the first plurality of angles, controls the tilt servo to adjust the tilt angle to a second plurality of angles centered at the angle having the lowest amplitude DPD signal in the first plurality of angles, and measures the amplitudes of the DPD signals for the second plurality of angles to find the optimal tilt angle”, as is claimed in claim 5 of the present invention.

A similar argument applies to claim 12. Specifically, Gleim does not teach a method of calibrating the tilt angle between an optical disc and an object lens in an optical storage device, the method comprising “controlling the tilt servo to adjust the tilt angle to a first plurality of angles, measuring the amplitudes of the DPD signals for the first plurality of angles, controlling the tilt servo to adjust the tilt angle to a second plurality of angles centered at the angle having the lowest amplitude DPD signal in the first plurality of angles, and measuring the amplitudes of the DPD signals for the second plurality of angles to find the optimal tilt angle.” These steps are simply not taught or suggested by Gleim.

For at least these reasons, applicant asserts claims 5 and 12 should not be found

unpatentable over Fukumoto et al. in view of Gleim (US 4,888,754). A similar argument also applies to claim 7. Claims 6 and 13-14 are dependent upon claims 5 and 12, respectively and should also be found allowable for the same reasons and additionally because these claims add in further limitations not disclosed by Gleim. Reconsideration of claims 5-7 and 12-14 is  
5 respectfully requested.

### New Claims

New claims 15-20 are added. No new matter is entered. In particular, new claims 15 and 17 are fully supported in paragraph [0023] stating, "The amplitudes of the DPD signal are  
10 compared for each tilt angle in the second plurality 402 of tilt angles and, because the tilt angle of 0.7deg has the lowest amplitude DPD signal, 0.7deg is used as the tilt angle by the optical disc system." Applicant notes that such operation is not taught by Fukumoto et al. because Fukumoto et al. require subtracting the DPD signal from the DPP signal (see Fig.1) in order to control the title control motor 102.

15 New claims 16 and 18 are fully supported in paragraph [0033] of the present invention stating, "Step 616: Set the tilt servo to the tilt angle having the lowest amplitude DPD signal in the plurality of tilt angles scanned in step 614. Tilt angle calibration is finished." Applicant notes that Fukumoto et al. do not teach setting the tilt angle having the lowest amplitude DPD signal (i.e., the optimal tilt angle as defined by the present invention) as the title angle  
20 between the optical disc and object lens.

New claims 19 and 20 are independent apparatus and method claims corresponding to original claims 1 and 8, respectively. The difference between original claims 1, 8 and 19, 20 is that the additional word "only" has been added in the limitation, "the tilt search block controls the tilt servo to adjust the tilt angle between the optical disc and the object lens  
25 according to only the DPD signal" in claim 19 and similarly in claim 20. No new matter is entered as such functionality is clearly shown in Fig.1 of the present invention where the tilt search block 110 generates the  $T_{DRIVE}$  according to only the DPD signal outputted by the DPD generator 108.

Applicant notes that the claimed limitations of claims 19 and 20 are not met by the teachings of Fukumoto et al., who show in their Figure 1 that the use of both the DPD signal and the DPP signal is required in order to control the tilt control motor 102. From said figure and the related description, it is understood that the tilt sense source is from the difference  
5 between DPD signal and the DPP signal as disclosed in Fig1 and Fig3. According to their teachings, not only the DPD signal is required, but also the DPP signal is necessary. Without at least the two signals, the difference signal will lose its indicated meaning and will not be a "difference signal". As far as the DPP signal is concerned, it needs both side spots (side beams) to generate DPP signal as described in claim 1 by Fukumoto et al. and in their  
10 specification. However, the present invention does not need to include the DPP signal for tilt detection. The DPP signal usually is used in recordable or rewriteable drives. For read only applications such as DVDROM drives or CE players, only the main beam (spot) is usable on DVD media as is commonly known. In such case, requiring the use of the DPP signal will limit the usefulness. Besides, as far as search/control algorithm of said optimal tilt angle is  
15 concerned, Fukumoto et al. do not describe finding the optimal tilt angle having a lowest amplitude DPD signal. Their search/control algorithm is clearly different and not an equivalent process because they require the DPP signal, unlike the present invention.

For at least these reasons, applicant asserts that claims 19 and 20 should be allowable with respect to the teachings of Fukumoto et al.

20 Consideration of new claims 15-20 is respectfully requested.

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Sincerely yours,



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